# BOOK REVIEWS AND NOTICES

*Economic Cycles: Their Law and Cause.* By HENRY LUDWELL MOORE. New York: Macmillan, 1914. 8vo, pp. viii+149. $2.00 net.

This new volume by Professor Moore is a brilliant companion for his *Laws of Wages.* It gives another opportunity for the display of his ability in applying abstruse mathematical analysis to economic phenomena. An attempt will be made to outline the reasoning and conclusions of the book and then to raise some questions concerning certain steps in the procedure.

The book aims to find the cause of the alternation of periods of activity and depression in business, and the law governing the alternation. Holding that agriculture is the foundation of manufactures and commerce, the first step is to discover whether there are cycles in weather and if there are, how they are related to the yield and price of crops. When studied by Schuster's method of employing Fourier's series, the mean annual rainfall for Cincinnati, Marietta, and Portsmouth, Ohio, for the years 1839–1910 shows probable cycles of 8 years' and 33 years' length. The curve of the annual rainfall of 7 to 30 stations in Illinois from 1870 to 1910 based on the assumption of the 8- and 33-year cycles fits the observed data better than the Ohio curve fits the Ohio data, and therefore the 8- and 33-year cycles are held to be established for Illinois and so for the chief grain-growing regions of the United States. The next point considered is the relation between the rainfall in Illinois and the yield per acre of corn, oats, hay, and potatoes. Wheat is omitted because of the impossibility of separating winter and spring wheat. These four crops comprise over nine-tenths of the acreage and value of the crops of Illinois. After eliminating the trend, if any, degrees of correlation varying from $+.290$ to $+.666$ are found to exist between the rainfall of Illinois for a period called the critical season of growth and the per acre yield of the crops in Illinois from 1870 to 1910. Assuming: (*a*) that the rainfall for any considerable part of the year gives, over a series of years, the same general type of curve as the annual rainfall; and (*b*) that high correlation between the yield per acre of the crop and the rainfall during its critical season indicates that the same general type of equation will fit both curves, curves are computed for the rainfall during the critical periods of the several crops and the yield

per acre of the several crops. The curves are made on the basis of the compound 33- and 8-year cycles and they are held to fit the data reasonably well. To test the relation of the rainfall to the four crops resort is made to index numbers. The index number for the fluctuations of crops is the arithmetic average of the results obtained by dividing the deviation of each crop (trend eliminated) from the mean yield for the period by the standard deviation. The mean effective rainfall for all the crops is found by taking the arithmetic mean of the sum of the effective monthly rainfall of the several crops, which is found by dividing the rainfall of the critical period of each crop by the number of months in the period. The correlation between the indices of the fluctuations of the crops and the rainfall in the critical periods is $+.584$. Curves of compound cycles of 33 and 8 years fit the data reasonably closely. So Moore concludes that the "cyclical movement in the weather conditions represented by rainfall is the fundamental, persistent cause of the cycles of the crops."

Demand-curves for the four crops in the United States are derived by comparing the relative change (to eliminate the effects of increasing population) in the amount of the crops and the relative change (to eliminate in part the effects of a fluctuating general price level) in the price per unit. This part of the analysis is extremely interesting both for the resulting demand-curves and for the discussion of the various methods for studying demand. The next problem is the degree of correlation between the yield per acre of the crops and their price for all the United States. The correlation coefficients for the four crops vary from $-.656$ to $-.873$ for the period 1866–1910. Moore concludes that the prices of the crops are as closely related to the yield per acre as to the total supply of the crops. To connect the figures for the United States with those of Illinois, the correlation between the annual differences in yield per acre in the United States and the corresponding differences in Illinois was computed for the period 1866–1912. It varies for the four crops from $+.745$ to $+.855$. So Moore concludes that the cyclical movement of yield per acre in Illinois may be taken as typical of the yield for the United States. The relation between the volume of crops for the whole United States and the activity of industry is next examined. An index number of the yield per acre of nine crops (weighted according to the value in 1911) is computed for the period 1870–1911, using the average of 1890–99 as the base. This index number is compared with the annual production of pig iron which is taken as a barometer of trade. The correlation coefficient of the yearly deviations of the

two series is +.254. The correlation coefficient of the cyclical movement of the yield per acre of the crops and the pig-iron production for the following year is +.719. The demand-curve for pig iron over the period 1876–1912 shows that the price rises with an increase of the product and falls with a decrease. The following explanation is proposed: increased yield of crops brings increased demand for producer's goods, an increase in employment, a rise in the demand-curve for crops, and finally a general rise in prices. The reverse follows a decrease in the yield of crops. To test this explanation the indices of wholesale prices (Falkner and the Bureau of Labor) and the indices of crop yield for the period 1870–1911 are compared, being smoothed by taking the three-year average. The deviations when correlated give the value of the coefficient +.303. The correlation coefficient of the cycles (with the trend eliminated) with a lag of prices of four years is +.800. It is therefore concluded that the cycles in the yield per acre of the crops are the fundamental persistent cause of the cycles in the activity in industry and of the cycles of general prices. And the cycles in the crop yield, it will be remembered, depend upon the cycles in rainfall in the critical period.

In general Professor Moore's work is admirable in its frankness in telling just what was done and why it was done, and his reasons are in the main convincing. One wonders just how much causal influence is left when we pass through so many steps, each lacking something of perfect correspondence, from the rainfall to the general prices. A casual examination of the general price-curve does not suggest 33- and 8-year cycles and Moore does not test the data for cycles nor give any figures for closeness of fit. The study is in sharp contrast with Mitchell's *Business Cycles*, since it considers only one cause of cycles and for this reason suffers somewhat in the sense of reality as compared with Mitchell's account. From all that is said, increased production of gold might affect the trend of prices but not the cyclical movement, which reasoning is hardly in accord with most of the recent monetary theory. After Professor Moore's complaint that his predecessors have neglected probability theory it is rather disconcerting to find that the probable error of the various coefficients has not been computed. On p. 100 it is recognized that prices fell from 1866 to 1890 and rose from 1890 to 1911, yet on p. 119 a falling trend is taken for the whole period 1870–1911. The use of the farm price on December 1, computed by the Department of Agriculture, as the price of crops for the year seems a little inadvisable. Would it not be better to take an average of the

prices for the year in the principal market for the crop? One typographical error is noted: on p. 28 a correlation coefficient is given as 6.00; it, obviously, should be .600.

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*Banking Practice and Foreign Exchange.* By E. L. STEWART PATTERSON and FRANKLIN ESCHER. New York: Alexander Hamilton Institute, 1914. 8vo, pp. xx+637. $2.50.

This book is Vol. VIII in the "Modern Business Series" edited under the supervision of Joseph French Johnson. It is the Canadian edition of Vol. VI, *Banking Practice* and *Foreign Exchange* written by Jefferson and Escher. The volume as a whole is about a third larger than the American edition. Mr. Patterson is the author of Part I, "Banking Principles," and Part II, "Banking Practice," both with reference to Canadian experience, and he has also collaborated with Mr. Escher in Part III on "Foreign Exchange." A word may be said first with reference to changes that have been made in this edition of Escher's treatise.

Four chapters have been added to "Foreign Exchange" and the first chapter has been rewritten and greatly extended. In all, it now covers 148 pages as against 70 pages in the American edition. Incidentally it may be stated that the present study is much more comprehensive and less elementary than Mr. Escher's little independent volume on *Elements of Foreign Exchange.* Chap. i in the new volume, on "Mechanism of the Exchange Market," contains a good statement of inland exchange operations and an account of exchange between New York and Canada. The mint par and gold points are more fully explained than in the previous volume; and there are comprehensive tables of rates and technical terms in eight or ten languages. In connection with finance bills Mr. Escher makes a statement of interest, one not made in his *Elements of Foreign Exchange.* He says (p. 442): "Concerning the exact meaning of 'finance-bill' it is surprising what a difference of opinion exists even among well-informed writers on exchange, but concerning the present meaning of the term as it is used in the exchange market in New York there is no chance for any difference of opinion. Among practical exchange men a finance-bill means just one thing—an unsecured long bill of exchange drawn by a banker in one country on a banker in another and sold for the purpose of raising money."